



Janet Lewis, Chief Electrical Inspector

Vol. 1 No. 11

November 1998

Our 11th month! Electrical code issues and answers.

● Public hearings for proposed changes to WAC 296-46 and 296-401A will be held:

December 11, 1998 1:00 PM

Department of Labor and Industries Building
Auditorium
7273 Linderson Way, Tumwater

December 16, 1998 1:00 PM

Spokane Service Location
Fourth Floor Conference Room
901 N. Monroe, Suite 100, Spokane

The proposed amendments adopt the 1999 National Electrical Code, create a new limited energy electrical contractor license, administrator certificate and HVAC/refrigeration limited energy technician certificate for work performed on HVAC/refrigeration limited energy control circuits. Also added are some technical changes and clarification of existing rule sections. The tentative adoption date for these rules is January 25, 1999 and the tentative effective date is February 26, 1999.

Copies of the proposed rule changes are available upon request by calling toll free at (800) 547-8367; or by written request to the Department of Labor and Industries, Specialty Compliance Services Division, P.O. Box 44460, Olympia, WA 98504-4460. Copies of the proposed rules will also be available at the public hearings and on the department's Internet site address in the footer below.

Oral and/or written comments on the proposed rules will be accepted at the public hearings. Comments on the proposed rules may be submitted to the department prior to or until December 28, 1998. Comments may be faxed to (360) 902-5292 (comments submitted by fax must be 10 pages or less).

● Plan review submittals based on 30-day metered demand data

The use of 30-day demand data in the optional calculation for additional load to an existing installation, as allowed in NEC 220-35(1) Exception, must also meet the requirements of WAC 296-46-140(4). Any demand data submitted must include all of the following: a) the date of the measurements; b) a diagram of the electrical system identifying the point(s) of measurement; c) building demand measured continuously on the highest-loaded phase of the feeder or service over a thirty-day period, with demand peak clearly identified. (Peak demand shall be defined as the maximum average demand over a fifteen-minute interval.)

When using this calculation method and submitting it to electrical plan review or the local field inspector, the use of the form on page 20 in the Electrical Plan Review Submittal Guide (available on our Internet home page, address below) will eliminate most problems. Keep in mind that the submitted data must be taken with a recording type meter and that the plans examiner/electrical inspector will require copies of the significant peak readings in the recorded data. Also, adjustment for system power factor, seasonal adjustment for heating or cooling loads (the greater of the two), and occupancy adjustment (change in occupancy of the building compared to occupancy at time of load study) must be made for this calculation method. Explanations of how the adjustment factors were derived and how the data readings were compiled are to be included with the presentation.

● Grounding equipment in patient care areas of healthcare occupancies

NEC 517-13(a) requires that *"In an area used for patient care, the grounding terminals of all receptacles and all noncurrent-carrying conductive surfaces of fixed electric equipment likely to become energized that are **subject to contact**, operating at over 100 volts, shall be grounded by an insulated copper conductor. The grounding conductor shall be sized in accordance with Table 250-95 and installed in metal raceways with the branch-circuit conductors supplying these receptacles and fixed equipment."* Exception No.1 adds type MI, MC, or AC cables to the permitted wiring methods, *"provided the outer metal armor or sheath of the cable is identified as an acceptable grounding return path."* These cables are identified by the manufacturer as "hospital-grade" or as complying with NEC 517 in some distinctive manner, such as green coloring or stripes on the cable sheath and/or appropriate information on the product listing and identification tags.

In patient care areas, lighting fixtures that are located *“more than 7 ½ ft (2.29m) above the floor shall not be required to be grounded by an insulated grounding conductor”* as permitted by Exception No.3 to NEC 517-13(a). Due to its elevation the lighting fixture is not considered to be subject to contact and therefore an insulated equipment grounding conductor is not required. This exception does not allow non-metallic sheathed cable or non-metallic raceways as the wiring method to these fixtures.

NEC 517-13(b) requires that *“all branch circuits serving patient care areas shall be provided with a ground path for fault current by installation in a metal raceway system or cable assembly.”* The apparent permissiveness of Exception No.3 to NEC 517-13(a) only addresses the requirement for an insulated equipment grounding conductor. NEC 517-13(b) makes it clear that a metal raceway system approved for grounding or metal sheathed cable assembly is always required for circuits that supply a patient care area.

● Service conductors considered “outside of a building”

When are service conductors inside of a building and when are they outside? This question has been asked several times in recent months and warrants a determination.

Any time conductors are installed within the “lines of a building” it is considered to be inside the building except as otherwise allowed by NEC 230-6. *“Conductors shall be considered outside of a building or other structure under any of the following conditions: (1) where installed under not less than 2 in. (50.8mm) of concrete beneath a building or other structure; (2) where installed within a building or other structure in a raceway that is encased in concrete or brick not less than 2 in. (50.8mm) thick; or (3) where installed in a transformer vault conforming to the requirements of Article 450, Part C.”*

Conductors that are installed **under** a building are considered to be inside the building, regardless of the burial depth, unless one of the above conditions from NEC 230-6 is met. It should also be noted that NEC 300-5(c) requires underground cables installed under a building to be in a raceway that extends beyond the outside walls of the building.

NEC 230-70(a) requires that *“The service disconnecting means shall be installed at a readily accessible location either outside of a building or structure, or inside nearest the point of entrance of the service conductors.”*

WAC 296-46-230-40(5) allows up to 15 feet of service raceway to be considered *“nearest the point of entrance.”* The “15 foot rule” is very generous. Whether buried or not, raceway inside the building lines cannot extend beyond 15 feet unless one of the conditions of NEC 230-6 allows the raceway or a portion of it to be considered outside the building.

● Ground rods at generators

A premises wiring system whose power is derived from a generator and the generator has no direct electrical connection, including a solidly connected grounded circuit conductor (neutral), to supply conductors originating in another system, must be grounded as specified in Section 250-26. This requires a bonding jumper to connect the equipment grounding conductors to the grounded conductor and a grounding electrode conductor to connect the grounded conductors to a grounding electrode. This is a separately derived system, and a grounding electrode system must be properly established at the generator location.

NEC 250-5 (FPN No. 1) states: *An alternate alternating-current power source such as an on-site generator is not a separately derived system if the neutral is solidly interconnected to a service-supplied system neutral.”* The most common example of this is an on-site generator installed as a backup source of power. This is the type that would employ a transfer switch to transfer utility and generator power. The transfer switch does not break the connection between the generator neutral and the utility grounded circuit conductor (neutral). The generator is required to have an equipment grounding conductor to ground any exposed noncurrent-carrying metal parts. This equipment ground must be a type specified in NEC 250-91(b) and run from the normal system ground to the generator frame. It should be noted that a supplementary grounding electrode at the generator location is allowed under NEC 250-91(c). A grounding electrode is not required by the NEC, but could be recommended by the generator manufacturer.